

EXAMINATION OF DIFFERENT PRETREATMENT METHODS TREATING MODEL WASTEWATER

Szabolcs Kertész¹, Dzsenifer Garai¹, Mihály Zakar¹, Cecilia Hodúr², Gábor Veréb¹, Sándor Beszédes¹, Zita Šereš³, Zsuzsanna László¹

¹Department of Process Engineering, Faculty of Engineering, University of Szeged,
H-6725 Szeged, Moszkvai krt. 9., Hungary

²Institute of Environmental Science and Technology, University of Szeged,
H-6725, Tisza Lajos krt. 103, Szeged, Hungary

³Faculty of Technology Novi Sad, University of Novi Sad,
Bul. Cara Lazara 1, 21000 Novi Sad, Serbia
kertesz@mk.u-szeged.hu

Abstract

Membrane filtration, as a promising technique has been developed and appeared to be a good solution for different separation problems. However it has a remarkable efficiency, there is an urgent need to develop pretreatment methods to avoid membrane fouling. The aim of this study was to test different pretreatment processes such as sedimentation, microfiltration (*MF*) and centrifugation before ultrafiltration (*UF*) of model dairy wastewater. The pretreatment effects on the membrane separation efficiencies were investigated and compared.

In the first part of this study, *MF* separation experiments using ceramic membrane were carried out. The influences of operational parameters, such as transmembrane pressure (*TMP*) and recirculation flow rate (q_{Vrec}) were investigated. Permeate fluxes, membrane resistances and membrane rejections were measured and calculated in terms of turbidity, conductivity, total dissolved solids (*TDS*), and chemical oxygen demand (*COD*) values.

In the second part of our work sedimentation and centrifugation experiments were examined.

These single methods like one stage pretreatment experiments were carried out at pH 4, 8 and 12 in order to know which condition has the best efficiencies. The results showed that acidic conditions had the highest decreasing rates. The most effective centrifugation parameters were 5000 rpm for 10 sec, which resulted 99.4 % turbidity rejection.

In the third part of my work *UF* separation experiments using polymer membrane were tested. During the *UF* experiments pH 4, 6 and 8 and the pore size of 7, 10 and 30 kDa were tested. The most efficient *COD* rejection was 58.9% using 10 kDa *UF* membrane at pH=4.

With the optimal parameters of the pretreatment processes *UF* will be tested in the near future in order to know the two stage process efficiencies on the membrane fouling decreasing.

Key words: pretreatment, microfiltration, ultrafiltration, dairy wastewater treatment

Acknowledgements: Authors are grateful for the financial support of the Hungarian State and the European Union (EFOP-3.6.2-16-2017-00010 – RING 2017) and the project Hungarian Science and Research Foundation (OTKA contract number K 112096). Project no. TÉT_16-1-2016-0138 has been implemented with the support provided from the National Research, Development and Innovation Fund of Hungary, financed under the TÉT_16 funding scheme (SRB project number 451-03-02294/2015-09/4).